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**COUPLING DEVICE BETWEEN A TOWING VEHICLE,
IN PARTICULAR A FARM TRACTOR AND A TRAILER**

Technical Field

The present invention relates to a coupling device between a towing vehicle, in particular a farm tractor, and a trailer having a coupling ball arranged on a coupling carrier of the towing vehicle, and a ball socket on the trailer side encompassing the coupling ball from above.

Prior Art

Coupling devices with a coupling ball assigned to the towing vehicle and a ball socket provided on the drawbar of the trailer and encompassing the coupling ball from above allow the trailer to be coupled and uncoupled at comparatively large pivot angles between the drawbar and the longitudinal axis of the towing vehicle. The possible pivoting movements of the ball socket relative to the coupling ball around both a vertical and a horizontal pivot axis also ensure advantageous conditions for cross-country travel. In addition to this there is a coupling procedure simplified by the self-centering action of the ball socket so that on the basis of these properties the use of such coupling devices could be offered for agricultural vehicles, for example, if the supported and trailing loads which can be accommodated by these coupling devices were not restricted to one mass only, prohibiting such use. In order to improve the carrying capacity of the usually deep-drawn ball sockets it has already been proposed to considerably enlarge the ball diameter, however sufficiently large ball diameters call for special constructions for taking up heavy supported and trailing loads, which limits the range of application of these coupling devices to special vehicles.

Description of the Invention

The object of the invention is therefore to arrange for a coupling device between a towing vehicle, in particular a farm tractor and a trailer of the type described at the outset, such that large supported and trailing loads can be accommodated without the ball diameter having to be enlarged.

The invention solves this task by the fact that the ball socket comprises a moulded article made of a ferrous material presenting a casting crust at least on the interior of the socket.

By providing a moulded article as a ball socket, surprisingly the carrying capacity of the coupling device was able to be decidedly improved by supported and trailing loads on condition that the moulded article is supported by a casting crust on the steel coupling ball. This casting crust obviously forms an intermediate layer which influences the power

transmission ratios between the coupling ball and the moulded article of the ball socket, such that overload of the moulded article of the ball socket can be discounted even with large supported and trailing loads. Supported loads of up to 5.5 t and trailing loads of up to 60 t were able to be taken up using coupling devices according to the present invention without overloading the coupling device.

Particularly advantageous load ratios can be achieved whenever the ball socket has a lesser hardness Rockwell hardness by 5 to 12 than the coupling ball made of hardened steel. In the case of a hardness difference of Rockwell hardness 6 optimum conditions for the customary fields of application could be guaranteed for dissipation of load by the coupling device.

To create easy connection options for example on the drawbar of the trailer for the ball socket formed by a moulded article, the moulded article can form the ball socket with a connecting plate which can be screwed on to the drawbar independently of the respective drawbar structure.

Brief Description of the Diagrams

The inventive object is illustrated by way of example in the diagrams, in which:

- Figure 1 shows the part of a coupling device according to the present invention on the towing vehicle side in a frontal, partly schematic view,
- Figure 2 shows the coupling device with the ball socket encompassing the coupling ball from above in a view according to line II-II of Figure 1, and
- Figure 3 shows the ball socket with an integrally cast connecting plate in an underneath view on an enlarged scale.

Best Realisation of Invention

As evident from Figures 1 and 2 coupling carrier 1 on the towing vehicle side is formed by a built-on frame 2 which can be connected conventionally to a farm tractor and which presents a vertical guide 3 for a height-adjustable trailer coupling 4 of conventional structure which can be bolted at individual heights, as indicated by dashed lines in Figure 2. Apart from this conventional trailer coupling 4 a selectively applicable coupling device 5 with a coupling ball 6 made of hardened steel is provided, which is inserted into a recessed bore 7 of coupling carrier 1. Said coupling ball 6 cooperates with a ball socket 8 on the trailer side formed by a moulded article 9 made of steel. Said moulded article 9 does not, however, form only ball socket 8, but also forms a connecting plate 10 for ball socket 8, as illustrated in Figure 3. By means of this connecting plate 10 ball socket 8 can be attached to a drawbar of a trailer for

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example, and even by means of screws for which through-holes 11 are provided in connecting plate 10.

To be able to bolt ball socket 8 set on coupling ball 6 from above in this coupling position a holding-down clamp 14, which can be swivelled about an axle 13 in a bearing block 12, is provided which can be secured in the locked position by means of a safety pin 15. When the trailer is to be uncoupled first holding-down clamp 14 is accordingly to be released by loosening safety pin 15 before holding-down clamp 14 is pivoted away from the ball socket and ball socket 8 can be lifted from coupling ball 6. When the trailer is hooked on, then in reverse order holding-down clamp 15 is to be pivoted against positioned ball socket 8 and secured.

Moulded article 8 exhibits at least on inner side 16 of socket facing coupling ball 6 a casting crust which is of prime importance for the desired dissipation of large supported and trailing loads from ball socket 8 to coupling ball 6 in conjunction with ball socket 8 being designed as a moulded article. Dissipation of large supported and trailing loads occurring in the case of agricultural trailers for example becomes possible with comparatively small ball diameters only by moulded article 9 supported on coupling ball 6 by a casting crust.

It probably does not particularly need to be emphasised that the invention is not limited to the illustrated embodiment. Thus, coupling carrier 1 can be arranged directly on the towing vehicle. Furthermore, bolting coupling device 5 in the coupling position can structurally be realised in various ways, because what matters only is that unintentional lifting of ball socket from coupling ball 6 is prevented.